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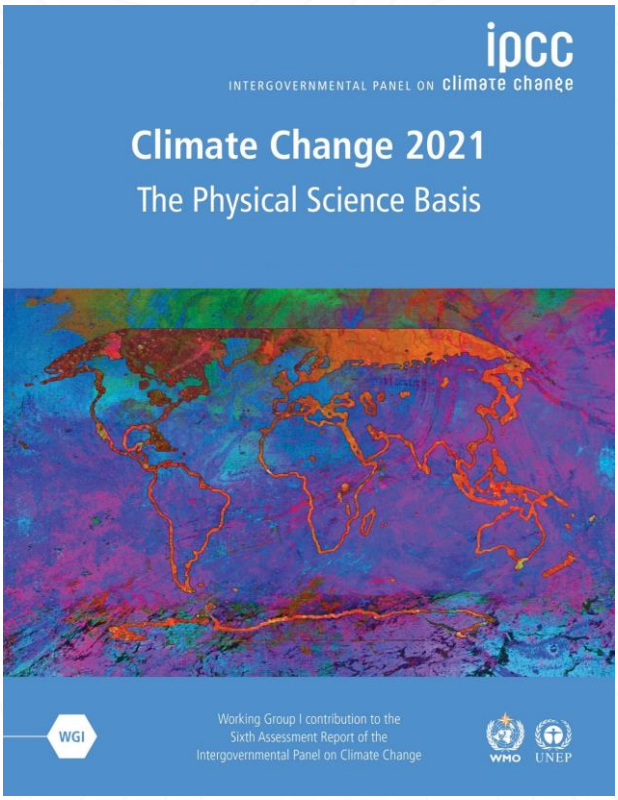


Summary for Policymakers

Link to the main report: IPCC AR6 WG1 (Full Report)
Link to the policymakers summary: Summary for Policymakers
Regional Data (Asia): Regional fact sheet - Asia

BACKGROUND

The Intergovernmental Panel on Climate Change (IPCC) has recently published its 6th assessment report (AR6) on global climate change explaining the drastic climatic characteristics and the causes behind it. Before this latest report, the IPCC had previously published five sets of "assessment reports" since its foundation in 1988. Each of these reports comprehensively and consistently lays out the rapidly accumulating evidence of a changing climate system.

IPCC reports are treated by scientists and policymakers as the backbone of Climate Change knowledge. With time the reports have gotten starker as it's become clearer that humans are changing the planet and just how severe the consequences of those changes will be. For example, the first report in 1990 concluded that it was too early to say if humans were changing the planet's temperature whereas the most recent report concluded that it was 95% likely that humans were driving the observed temperature changes.

The reports are written by experts such as physicists, atmospheric and oceanic scientists, energy specialists, and economists. Representatives from 195 countries commission the reports from the academics. Since these reports are meant to serve governments and negotiations around the world, all the different governments have to sign off that they're on board with them.

ABOUT 6TH ASSESSMENT REPORT (AR6)

The sixth report is split up into three sections: **the physical science basis**; **impact adaptation and vulnerability**; and **mitigation of climate change**. All IPCC work is shared among three Working Groups. In August 2021 the first section prepared by Working Group I (WGI), on the physical science basis, was released. The other two sections by Working Group II (WGII) and III will be released later, in 2022. The Working Group I consists of 234 authors from 65 countries who reviewed 14,000 scientific studies to prepare the report.

What we'll see in this section of the report is the definitive view on questions like: How much has the world warmed? How fast is the sea level rising? What do the regional impacts of climate change look like? And what might the future hold?

What we won't get is a detailed breakdown of human impacts of climate change or what we can do to adapt to these impacts, since those will go in the second section by Working Group II. We also won't see a detailed idea of what we can do to stop climate change by cutting greenhouse gases, since those will go into the third section by Working Group III (WGIII).

The 6th report follows a set of calibrated language to communicate levels of certainty behind the statements it included. These terms fall into two categories:

Confidence: A qualitative measure of the validity of a finding, based on the type, amount, quality and consistency of evidence and the degree of agreement among authors. A level of confidence is expressed using five qualifiers: *"very low," "low," "medium," "high," and "very high".*

Likelihood: A quantitative measure of certainty in a finding, expressed probabilistically, based on statistical analysis of observations or model results, or both, and expert judgement

Confidence Terminology	Degree of confidence in being correct
Very high confidence	At least 9 out of 10 chance
High confidence	About 8 out of 10 chance
Medium confidence	About 5 out of 10 chance
Low confidence	About 2 out of 10 chance
Very low confidence	Less than 1 out of 10 chance

Likelihood Terminology	Likelihood of the occurrence/ outcome
Virtually certain	> 99% probability
Extremely likely	> 95% probability
Very likely	> 90% probability
Likely	> 66% probability
More likely than not	> 50% probability
About as likely as not	33 to 66% probability
Unlikely	< 33% probability
Very unlikely	< 10% probability
Extremely unlikely	< 5% probability
Exceptionally unlikely	< 1% probability

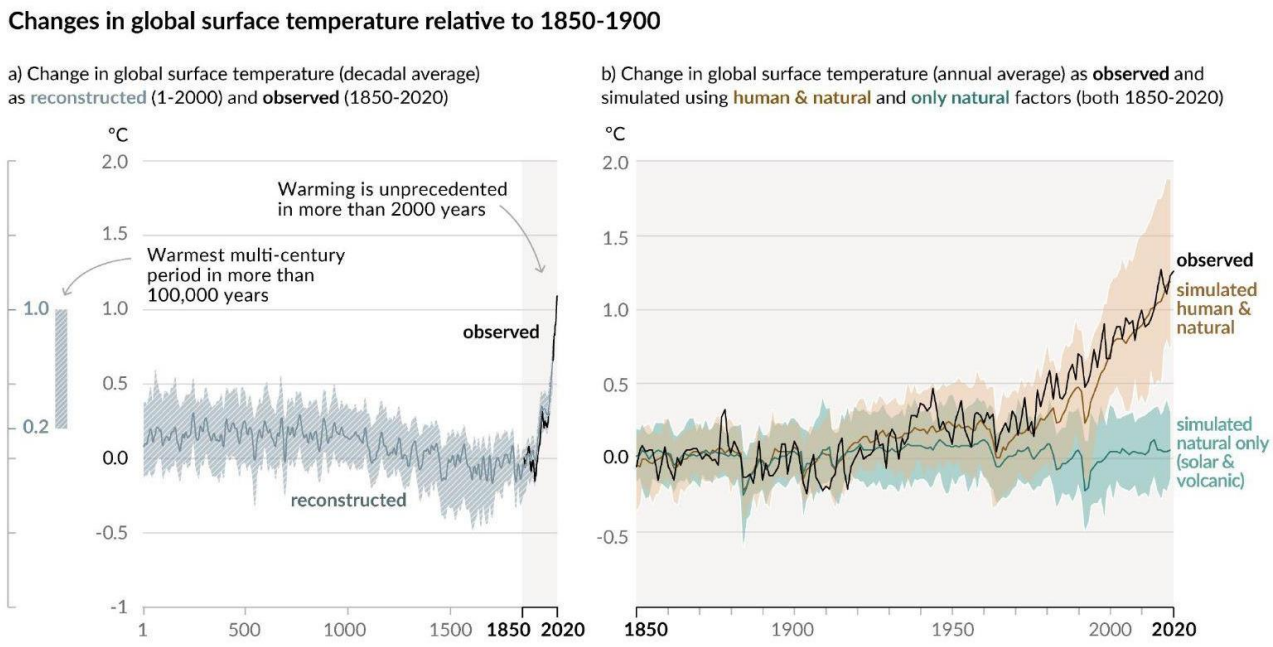
This first section of the report is being published in time to help inform the negotiations taking place in Glasgow starting in October of 2021. Previously IPCC reports have had a huge influence in major Climate Conferences. For example, the special report on 1.5 degrees of global warming had a massive impact not just on policymakers, but also the public discussion of climate change and their understanding of what we consider a "safe" level of global warming.

CURRENT STATE OF CLIMATE

Since the 5th Assessment Report (AR5), improvements in observationally based estimates and information from paleoclimate archives[1] provide a comprehensive view of each component of the climate system and its changes to date. New climate model simulations, new analyses, and methods combining multiple lines of evidence lead to improved understanding of human influence on a wider range of climate variables, including weather and climate extremes. In other words, scientists and academicians now can identify causes, models, impacts and timelines of climate change more accurately.

Key Takeaways

- It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.

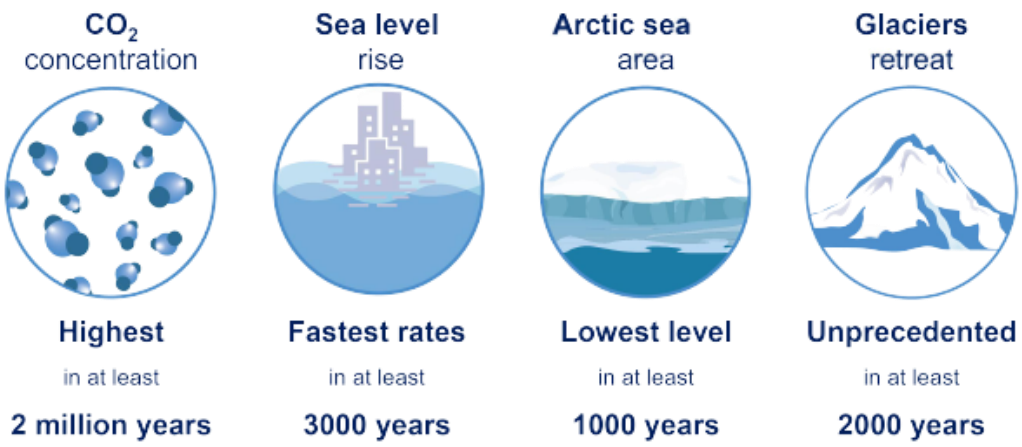


- Improved knowledge of climate processes, paleoclimate evidence and the response of the climate system to increasing radiative forcing gives a best

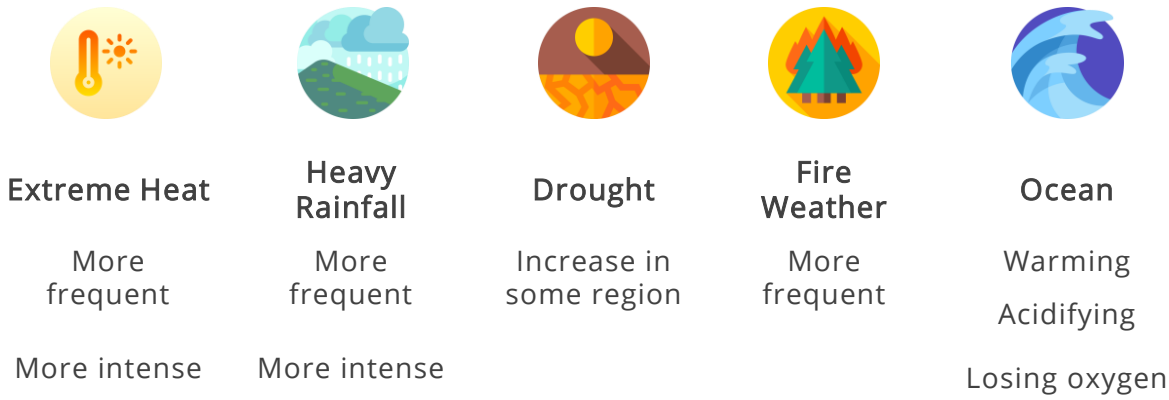
[1] **Paleoclimate archives** consist of geologic (e.g., sediment cores) and biologic (e.g., tree rings) materials that preserve evidence of past changes in climate.

estimate of equilibrium climate sensitivity[2] of 3°C, with a narrower range compared to the 5th Assessment Report (AR5).

- The scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years.



- Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened since the Fifth Assessment Report (AR5) in 2013.



[2] **Equilibrium Climate Sensitivity (ECS)** is defined as the global mean surface air temperature increase that follows a doubling of atmospheric carbon dioxide **compared to pre-industrial levels.** Pre-industrial CO2 was about 260 parts per million (ppm), so a doubling would be at roughly 520 ppm. Current levels of atmospheric CO2 have now exceeded 410 ppm.

POSSIBLE CLIMATE FUTURES

The new report features five climate narratives that differ in terms of the level of projected warming and society's ability to adapt to the changes ahead. Each narrative pairs a different socioeconomic development scenario with a different carbon emissions pathway, resulting in different endings to the story of 21st-century climate change. These future scenarios are called Shared Socio-Economic Pathways[3] (SSPs). There are two relatively optimistic scenarios (SSP1-1.9 and SSP1-2.6), a middle-of-the-road one (SSP2-4.5), a dark future (SSP3-7.0), and business as usual/ high emission scenario (SSP5-8.5).

The amount of warming projected under each of these scenarios is shown in the chart below. In the lowest emissions scenario SSP1-1.9 (light blue line), temperatures reach 1.4C above 1850-1900 levels in 2081-2100, whereas they climb 4.4C under SSP5-8.5 (dark red).

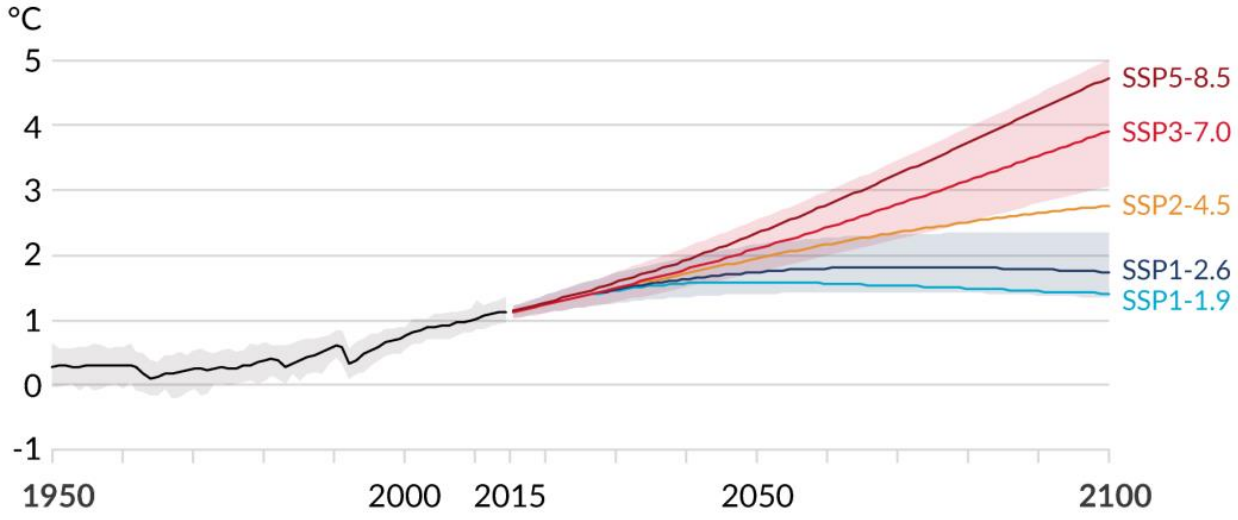


Figure: Global surface temperature changes relative to 1850-1900, degrees C, under the five core emissions scenarios used in AR6

The relatively optimistic scenarios (SSP1-1.9 and SSP1-2.6) are consistent with the Paris Agreement goal of keeping global warming below 2°C. In these futures, nations act immediately and aggressively to reduce their fossil fuel use. Global emissions reach net zero in the middle to late 21st century before dipping into the negative as humanity starts capturing huge amounts of carbon dioxide out of the air, using technology that has yet to be proved at large scale. By the end of the century, Earth has warmed by approximately 1.4°C in the SSP1-1.9 scenario

[3] **Shared Socioeconomic Pathways (SSPs)** are scenarios of projected socioeconomic global changes up to 2100. They are used to derive greenhouse gas emissions scenarios with different climate policies.

and 1.8°C in the SSP1-2.6, with the differences related to the speed of emissions reductions and the rate at which we deploy carbon capture technology.[4]

> SSP1-1.9: Holds warming to approximately 1.5C above 1850-1900 in 2100 "after slight overshoot" and implied net-zero CO2 emissions around the middle of the century.
>
> SSP1-2.6: Stays below 2C warming with implied net-zero emissions in the second half of the century.
>
> SSP2-4.5: Approximately in line with the upper end of combined pledges under the Paris Agreement. The scenario "deviates mildly from a 'no-additional climate-policy reference scenario, resulting in a best-estimate warming around 2.7C by the end of the 21st century".
>
> SSP3-7.0: A medium-to-high reference scenario resulting from no additional climate policy, with "particularly high non-CO2 emissions, including high aerosols emissions".
>
> SSP5-8.5: A high reference scenario with no additional climate policy. Emissions as high as SSP5-8.5 are only achieved within the fossil-fueled SSP5 socioeconomic development pathway.

The 6th Report also assessed warming projections for each of the five emissions scenarios in the near-, mid-and long term.

Near term, 2021–2040			Mid term, 2021-2060		Long-term, 2081–2100	
Scenario	Best estimate (C)	***Very likely*** range (C)	Best estimate (C)	***Very likely*** range (C)	Best estimate (C)	*Very likely* range (C)
SSP1–1.9	1.5	1.2 to 1.7	1.6	1.2 to 2.0	1.4	1.0 to 1.8
SSP1–2.6	1.5	1.2 to 1.8	1.7	1.3 to 2.2	1.8	1.3 to 2.4

[4] **Carbon capture technology** involves trapping the carbon dioxide at its emission source, transporting it to a storage location and isolating it. The efficacy of this technique will be elaborated in the third section "Mitigation of Climate Change" of the 6th Assessment Report to be released in 2022

SSP2– 4.5	1.5	1.2 to 1.8	2.0	1.6 to 2.5	2.7	2.1 to 3.5
SSP3–7.0	1.5	1.2 to 1.8	2.1	1.2 to 2.8	3.6	2.8 to 4.6
SSP5–8.5	1.6	1.2 to 1.9	2.4	1.3 to 1.9	4.4	3.3 to 5.7

In the middle-of-the-road scenario (SSP2-4.5), carbon emissions remain high until the middle of the century before starting to decline. By the end of the 21st century, the world has warmed by around 2.7°C. This scenario is "roughly consistent"[5] with nations' 2030 climate pledges under the Paris Agreement, meaning it's the future the earth is on track for if the world fails to adopt more aggressive emissions reductions measures.

In the IPCC's dark future (SSP3-7.0), global cooperation collapses as nationalism takes a stronghold on countries. Economic growth and social progress stall. Among the world's many impoverished nations, birth rates remain high, causing the global population to rise to over 12 billion by the century's end from nearly 8 billion now. Carbon emissions continue to rise throughout the century as well, causing global temperatures to reach a sizzling 3.6°C above pre-industrial levels by 2100. Droughts and floods worsen considerably, summertime Arctic sea ice vanishes, and what was once 50-year heat waves occur nearly 40 times more often.

Finally, there's the business as usual/ high emission scenario (SSP5-8.5). In this world, humanity doesn't just fail to reverse its emissions curve, it doubles down on fossil fuel extraction and energy-intensive lifestyles. As nations dig up and burn more and more coal throughout the century, the world warms by 4.4°C, hotter than it has been in millions of years.

Key Takeaways

- Global surface temperature will continue to increase until at least the mid-century. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades.

[5] **Source:** Zeke Hausfather

- Many changes in the climate system become larger in direct relation to increasing global warming. They include increases in the frequency and intensity of hot extremes, marine heatwaves, and heavy precipitation, agricultural and ecological droughts in some regions, and proportion of intense tropical cyclones, as well as reductions in Arctic sea ice, snow cover and permafrost.

- Continued global warming is projected to further intensify the global water cycle, including its variability, global monsoon precipitation and the severity of wet and dry events.

- Under scenarios with increasing CO2 emissions, the ocean and land carbon sinks are projected to be less effective at slowing the accumulation of CO2 in the atmosphere.

- Many changes due to past and future greenhouse gas emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets and global sea level.

BANGLADESH PERSPECTIVE

This is the first time IPCC has released regional factsheets. The Asia projection maps indicate annual mean temperatures will increase by 1-2°C relative to the 1850-1900 period in case of 1.5°C to 2°C global warming. There are likely to be 90 to 120 days in a year with maximum temperatures above 35°C in case of 1.5 to 2°C warming and over 180 days in case of 4°C warming.

In 2020, Bangladesh suffered its second longest and worst flood since 1998, which lasted for over 40 days. In 2018, it saw the highest water levels during floods in history, a record that got broken the next year. Data suggests that the frequency of floods and cyclones has increased in the country in recent years. These events are compelling natives to migrate to highlands creating unplanned urbanization.

Key Takeaways

- Bangladesh is ***likely*** to face more frequent and more intense heavy rainfalls, flooding, and cyclones due to global climate change in the coming days

- Heatwaves and humid heat stress **will** be more intense and frequent during the 21st century ***(medium confidence)***

- Due to global warming, the frequency of category 4 and category 5 cyclones will increase in Bangladesh.
- Coastal areas **will** see continued sea-level rise throughout the 21st century, there will be more frequent and severe coastal flooding in low-lying areas and there will be coastal erosion.
- Both annual and summer monsoon precipitation **will** increase during the 21st century, with enhanced interannual variability ***(medium confidence)***
- Heat extremes have increased while cold extremes have decreased, and these trends will continue over the coming decades over Asia.

LIMITING FUTURE CLIMATE CHANGE

From a physical science perspective, limiting human-induced global warming to a specific level requires limiting cumulative CO2 emissions, reaching at least net zero CO2 emissions, along with strong reductions in other greenhouse gas emissions. IPCC suggests **anthropogenic CO2 removal (CDR) bears the potential to reduce CO2 emissions** from the atmosphere and store it in reservoirs. CDR can achieve net-zero CO2 emission If implemented at a scale where anthropogenic removals exceed anthropogenic emissions.

The comprehensive assessments of different mitigation and adaptation measures are left to the **WG2 (Impact adaptation and vulnerability)** and WG3 **(mitigation of climate change)** reports to be released in 2022.

CONCLUSION

The Intergovernmental Panel on Climate Change (IPCC) has a long history of choosing its words carefully. But in the recent report (AR6), the tone has shifted. The first striking thing about this report is the first thing it says, which is: "It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred."

To put this into context, IPCC reports are normally filled with the language of **"extremely likely"** or **"high confidence"** and so to have in this report, which the world's governments have signed off on, this **unequivocal statement** - is significant. In fact, there's strong language throughout the report, with the word **"unprecedented"** coming up multiple times.

The report points out that temperatures are now higher than they have been for any extended period for at least 100,000 years. But the report breaks down today's climate change in much more detail than just globally average temperature rises. It emphasizes that climate change is already here, today. As the report says: "human-induced climate change is already affecting many weather and climatic systems in every region across the globe." In other words, everywhere - everyone - on Earth is now experiencing changes in extreme weather events, whether that's in the form of heatwaves, downpours or droughts.

This is climate change today. In terms of the future, we see that the report considers different emission scenarios to imagine different future climates. These range from catastrophic emission scenarios where humans keep emitting more and more, to scenarios where we incredibly aggressively cut emissions to zero and then start removing carbon dioxide from the atmosphere. In some of those endings, humanity rises to the climate challenge while making concurrent efforts to reduce poverty and improve quality of life for everyone. The world is hotter and the weather is more dangerous, but the worst climate impacts are averted and societies are able to adapt. In others, global cooperation is fractured by nationalism, increases in poverty, soaring emissions, and unimaginably hot weather.

If what is pledged currently (in terms of global emissions cuts) is implemented, then we would be following SSP2-4.5. But given that not everything that is pledged is already put into practice and policy, we're rather trailing somewhere between the SSP2-4.5 and the SSP3-7.0 scenario. Nations representing approximately two-thirds of global emissions have now committed to zeroing out their emissions by the middle of the century. If these countries are able to make good on their pledges, and if other developing nations follow suit — it does put warming outcomes between 1.5 and 2 (degrees) very much on the table.

This report also explores the carbon budget, introduced in the previous report, that says how much more carbon dioxide we could emit before hitting the 1.5 degree marker. The report calculates that humans can release just 500 billion more tones of carbon dioxide which is about 15 years of industrial emissions at the rate we are going. To stay within the carbon budget, every country in the world would have to be net zero[6] by 2050 which is a phenomenally large task given that none of them are showing a consistent downward trend of any sort. It is important to note that this should not be a cause for utter pessimism. Even after we do break 1.5 degrees, every single degree of warming will make more of a difference, therefore everything that the world can do to both mitigate and to adapt to that will make a huge difference to people's lives and livelihoods.

[6] **Net Zero** refers to the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere. Net zero when the amount added is no more than the amount taken away.

What happens now after this report is entirely dependent on the political process political will the countries can muster. The 26th Conference of Parties (COP26)[7] of the United Nations Framework Convention on Climate Change (UNFCCC) is to be held in Glasgow, Scotland in November. This report will be addressed critically in this mammoth summit. A key feature of the conference is the long-awaited pledge of the developed countries delivering USD 100 billion to developing nations to tackle climate change. The amount is supposed to be spent on adaptation and mitigation activities.

Bangladesh is one of the developing nations that shall be under the scheme of climate finance in COP26. The country has to assure an efficient provision of the amount in combating climate change by adaptation and mitigation and the amount has to reach the most vulnerable in the system. The imminent conference is a glimmer of hope for Bangladesh as the fund can be utilized to support the marginalized to sustain climatic consequences like more heavy and intense rainfall, cyclones, longer droughts, etc. The IPCC report has shed light on the necessity of the coming COP26 and how it can help Bangladesh, as well as other developing nations, fight these intensities and extremes of nature.

[7] **The Conference of Parties (COP)** is the decision-making body responsible for monitoring and reviewing the implementation of the United Nations Framework Convention on Climate Change. It brings together the 197 nations and territories – called Parties – that have signed on to the Framework Convention. The 2021 meeting will be the 26th meeting, which is why it's called COP26.

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ACKNOWLEDGEMENT

Prepared by

- **Shoaib Mahmudul Hoque**, Lead, Environment and Climate Change Network
- **Samin Mahmud Khan**, Apprentice, Governance Apprenticeship
- **Sabyasachi Karmaker**, Apprentice, Governance Apprenticeship
- **Shailee Ahmed**, Apprentice, Governance Apprenticeship

Designed by

- **Wahib Mohammad,** Head of YPF Creative